

SOFTWARE TO SUIT YOUR COMPUTER

PROGRAMMING IN BASIC

Software To Suit
Your Computer

SYNERGISM AND SERENDIPITY

Phil Lemmons, West Coast Editor of BYTE, The Small Systems Journal, wrote in the March, 1983 issue, an excellent article about the software revolution. He discussed the use of such storage mediums as laser cards (no bigger than a credit card and holding two million bytes of data). He also summed up his own excitement about what is taking place in our world with these remarks:

The coming availability of inexpensive 10-megabyte read-only mass storage, in the form of the Laser Card, will no doubt broaden the application of the microcomputer in ways unforeseen. One of the delights of watching the microcomputer industry is that each round of progress feeds on the next in a combination of synergism and serendipity. Just as 16-bit microprocessors and 64K-bit (eight of these chips make up 64K bytes) RAMs made possible today's software revolution, and the software revolution demands new mass-storage technology and finds the Laser Card ready, so this new mass-storage technology will feed the software revolution. What software will this new technology make possible? What new hardware will that new software demand? Something is bound to turn up.

SYNERGISM: *The joint action of discrete agencies in which the total effect is greater than the sum of their effects when acting independently.*

SERENDIPITY: *The gift of finding valuable or agreeable things not sought for.*

Software To Suit Your Computer

INTRODUCTION

The ability of any computer to perform tasks reliably and efficiently is, to a large extent, dependent upon the quality of the software. In this supplement, we will be discussing the various factors which should be considered when you are ready to add programs to your computer system or furnish programs for clients.

The first and most important consideration is to determine exactly what your needs or the client's needs really are. There are many hundreds of options open to you, but no one can tell you what you or your customers really want.

Before we examine the details involved in making this decision, let's review some of the various categories of software.



FIGURE 1 — How do you know whether to create, customize or use extant programs "as is" to meet client needs? You first have to spend sufficient time with a client so you can thoroughly analyze the software requirements. And if a program out of a book or already on tape will do the job, why reinvent the wheel?

THE 820 BULLETIN

Xerox 820 Users Group / Orange County, California
May 1982

Vol. 2, No. 4

Next Meeting: 9 a.m. Sat., May 7

16-Bit Xerox 816 May Hit Market This Month; Aim Is to Qualify for Big USAF Contract

Reports abound that Xerox will unveil a 16-bit microcomputer on April 26. Xerox President David Kearns was scheduled to hold a news briefing at the New York World Trade Center that day. One Xerox insider told the media that Kearns might introduce the 16-bit micro at the briefing.

A procurement source in the federal government indicated that Xerox must introduce a microcomputer with both 8-bit and 16-bit chips if it is to qualify for a U.S. Air Force contract for 6,000 micros.

Bids are due May 3 and Xerox apparently must announce if it wants to stay in the running.

Sources in Southern California indicated the new machine will be called the Xerox 816. It will be available as an upgrade to the Xerox 820-II at a cost of \$500 to \$1,000.

When they would be available to present. Users is only speculation, especially if Xerox were to win the USAF contract.

The upgrade will be worth waiting for. These local sources say the new machine will have 64-K of 8-bit memory and 128- to 256-K of 16-bit memory — all addressable through CP/M.

Oh, happy spread sheet!

820 Bulletin Late; Editor Injured in Fall

The 820 Bulletin is late this month. Sorry about that. The editor suffered a stage-two shoulder separation in a fall two days after last month's meeting. He was up for two weeks.

Then the disk drive and printer began ing up. (Ever try carrying a Diablo 630 one arm?) The problems were solved, the C.C. Moore and The Bristol Street Store.

If the Diablo 630 Gets Stuck, Here's a

The Diablo 630 has a lot of smart to its chips. If you're the explorer and you get playing around with the key while the 630 is on, you can cha of its factory-set instructions.

If that happens, here's a fix from Store that will return it to default. With the computer and printer on at the A prompt, type: CTRL P, ESC Z, uppercase (Shift) E and RETURN.

That should restore its good as you get back to productive work.

McCallough of Orange Computo Will Talk About Networking for the Xerox 820 at May Meeting

Darrel McCallough, president of Orange Computo, Irvine, will be the guest speaker at the Orange County 820 Users Group meeting on Saturday, May 7.

The meeting will begin at 9 a.m. at Mercury Savings & Loan in Tustin. Directions to get there are on the back of the Bulletin.

Be sure to park far in the back of the lot as Mercury is open for business on Saturday.

Orange Computo is a manufacturer of networking equipment for desk-top computers. A partner in a non-affiliated company said he had been watching Orange Computo for several months.

He was highly impressed with its data from one 820 to

RAMBLINGS

THE TIMEX® COMPUTER CLUB NEWSLETTER

For Timex
Computer Club
Members

WELCOME TO THE CLUB

Ball of you who've joined the TIMEX Computer Club, we'd like to extend our warmest welcome.

Last August, TIMEX® brought the first American-made personal computer to the popular response has been almost beyond belief. Thanks to you, the T/S 1000™ has become one of the most talked about personal computers in America. We thank you for your acceptance, your loyalty, and your on-going interest.

Believe it or not, we're going to try to make the forthcoming year even bigger, better and more exciting.

Corps de TIMEX

The TIMEX Computer Club is an exclusive group of some 35,000 (and growing daily) TIMEX Sinclair™ computer owners.

Membership in the club will allow you to increase your enjoyment — and get the most out of your TIMEX Sinclair Personal Computer.

As a member, you will receive regular and early notification of TIMEX's technological advances, new hardware and software products, creative programming ideas, and special product and software offers. You will be receiving your personalized membership card in the near future.

If you have not already done so, please do be sure to return your Warranty Card (and tell your friends to do so also) to start your enrollment in the TIMEX Computer Club.

Lastly, if you know of any TIMEX Sinclair Computer owners who have not yet joined our club, please tell them to contact TIMEX to request a free membership application.

MAIDEN VOYAGE

This is the first issue of the TIMEX RAMBLINGS, the voice of the TIMEX Computer Club. We hope that you will enjoy this newsletter and continue to look forward to each month's journey into the fascinating world of the TIMEX Sinclair Personal Computer.

Each month you'll explore different areas of your T/S computer, learn about interesting and exciting forthcoming new products, and experiment with novel ways to get more enjoyment and pleasure from your system.

Every month you'll get the "lowdown" on the latest operating hints and tips, be among the first to hear about special TIMEX offers (including those specially for members of the TIMEX Computer Club), and best of all, you'll have your own forum for communicating directly with thousands of other TIMEX Sinclair Personal Computer owners. (Please do be sure to send us your ideas, articles, suggestions, and programs.)

We hope you will be looking forward to next month's issue.

HOT LINE

We've got some really "hot" news for you. The TIMEX toll-free hot line is open for business!

To obtain a quick and friendly answer to your TIMEX Sinclair Computer operation and/or programming questions, please call 1-800-24-TIMEX anytime between the hours of 8:00 a.m. to 8:00 p.m. EST, week-days or from 9:00 a.m. to 7:00 p.m. on Saturday.

And, if our fully-trained technical advisors do not have an immediate answer, we'll research your question until we do have an answer and return your call promptly.

Unfortunately, there may be times when the phone lines are busy. To those of you who have tried to call us — and haven't been able to get through — we apologize and ask for your patience, but please do keep trying.

Finally, should you wish to contact TIMEX by mail, please address your letter to:

TIMEX Computer Corporation
TIMEX Computer Club
P.O. Box 2555
Watertown, Connecticut 06725

ATTN: Technical Support Department

MAILBOX

First and foremost, RAMBLINGS, the TIMEX Computer Club Newsletter, is a fun for you, the T/S user. Through this newsletter, we'll exchange valuable and useful technical ideas, programs, and discuss other topics of mutual interest.

We gratefully solicit your articles, programs, suggestions, critiques, and brainstorming. Please mail your contributions to the RAMBLINGS Editor.

and if we publish your material during April or May, we'll say thank you by sending you a free TIMEX t-shirt. Please state your shirt size with your contribution.

FEATURES in this issue:

- Cursors are Characters . . . page 2
- Printers page 3
- Word & Dollar page 3
- Sits and Bytes page 4
- It's a Real Bargain page 4
- We're Proud of Our User Groups page 4
- Bugs and Gremies page 4
- TIMEX Technical Revolution page 5
- Computer Vocabulary page 6

VOLUME 1, NUMBER 1
MARCH 1982

FIGURE 2 — User newsletters are springing up everywhere. Ideas, problems and solutions are shared. Many users seek help from programmers. The newsletters are excellent sources of contacts and business.

FINANCIAL RECORD KEEPING

Software in this category includes programs for collecting and maintaining information about the financial status of both home and business; ranging from accounting packages (accounts receivable and payable), general ledger, depreciation, budgeting, cash flow analysis, planning, tax preparation, bank checking and savings accounts).

SPREADSHEETS

These programs allow you to maintain and analyze large volumes of data involving such diverse applications as inventory, finance, stamp or coin collections, album collections, etc. Some of these programs provide a means for entering calculations which can produce statistical analyses, such as totals, averages, means and standard deviation.

LOANS, STOCKS AND INVESTMENTS

Software in this category gives the user the capability of entering data which provides information on personal and business loans in terms of interest at varying rates, payment schedules and amortization. Stock and investment programs give information about returns on investments, stock options, mutual funds, financial portfolios, real estate and more.

WORD PROCESSING

Word processing software turns a computer into a super-typewriter capable of creating letters and documents. There are many advantages that a word processor has over a regular typewriter. The entered text can be edited or changed without the need for retyping the entire page. Multiple copies of the document can be produced on an "as needed" basis. Paragraphs can be inserted or rearranged as desired. Pages and lines can be formatted and margins can easily be set and justified. Some word processing programs also come with spellers; it is like having a small dictionary inside the computer.

APPOINTMENT KEEPING AND SCHEDULING

Computerized calendars can be used to keep appointments, pay bills on time, "remember" birthdays and anniversaries. They can also be used to maintain production schedules, employee work schedules and product deliveries. These programs can replace the personal and business calendars. It is possible to set up a 12-month tickler file which can be edited and extended on a daily basis.

EDUCATION

Software can be written to serve many educational needs. A major need is to assist students in learning various subjects. Programs are available for spelling, foreign languages, computer usage, arithmetic, electronics, geography, astronomy, physics, biology, religion, speed reading and much more.

INDUSTRIAL SOFTWARE

Whether it is a repetitive loop program which measures the density of a metal, or the most sophisticated robotic "brain", software is used extensively in industry. Much of this software is developed by the manufacturer of the equipment, but there are also large numbers of programs developed by user companies for internal applications.

If the program does have application to many industries (a program for operating a drill press, for example), then entrepreneurs are certain to offer a package of hardware and software to fill the need.

PROFESSIONAL SPECIALTY SOFTWARE

Almost every profession has a growing quantity of available software. Attorneys are able to purchase or lease programs and store legal libraries which will provide answers to legal problems.

Medical programs can provide diagnostic information when the doctor inputs a patient's



FIGURE 3 – These are three of the many popular and informative computer periodicals which report latest software, hardware and other developments.

symptoms. Actuarial programs give the life or health insurance company data for establishing insurance rates and medical fee schedules. Scientists can obtain data banks and programs on everything from micro-marine biology to nuclear fission.

AGRICULTURAL SOFTWARE

A growing number of agricultural programs are commercially available. These cover everything from feeding swine to estimating crop yields. Soil analysis, fertilizer mixing and spray formulas provide the modern farmer with data necessary to operate an efficient farm.

PROGRAMMING TOOLS AND UTILITIES

These programs can be divided into several sub-categories which extend the power and capability of your computer system.

Utility Programs

Generally written in machine language, these programs aid in the development of BASIC applications. Some provide a means for remembering, deleting and changing BASIC statements. Others will allow for two programs to be merged together. Others may make tape loading and saving faster and more dependable.

In The Queue	
BYTE	Volume 8, Number 3
	March 1983
Features	
26 Build the ECM-103, an Originate/Answer Modem by Steve Garcia / The Texas Instruments TMS99532 forms the heart of a Bell-103-compatible modem.	331 A Peek into the IBM PC by Tim Field / An assembly-language program enables an Epson printer to display all 256 characters used by the IBM PC.
34 The Enhanced VIC-20, Part 2: Adding a 3K-Byte Memory Board by Joel Swank / Supplement the VIC-20's standard 5K bytes of RAM and eliminate those annoying "out-of-memory" messages.	389 Keywords in a Fuzzy Context by Thomas A. Smith / C&ASIC programs for bibliographic search tell you the degree to which various articles meet your requirements.
44 A User's View of COMDEX by Jerry Pournelle / An impressionistic report of one of the largest gatherings of computer dealers and manufacturers.	418 ROTERP: An Interpretive Language for Robot Control by Gary Liming / High-level languages may help bridge the gap between artificial intelligence and the home experimenter's robot.
56 The Promise of Perpendicular Magnetic Recording by Clark E. Johnson Jr. / As the Japanese seem to have realized already, PMR represents the next level of recording technology.	436 Using SOUND Arguments for High-Precision RTTY by Scott Persson / How to generate radioteletype audio frequencies from an Atari 800.
68 New Developments in Floppy Disks by Tom Moran / New advances in floppy-disk-drive technology spurs intense competition.	453 Binary-Format Number Storage on the Apple II Disk by David Eyes / A machine-language routine to read and write binary data to a text file.
86 Optical-Memory Media by Edward Rothchild / Some background on how optical disks work, who makes them, and how much data they can hold.	
110 Will Removable Hard Disks Replace the Floppy? by Larry Sarsky / Improved data-storage technologies may eventually eliminate floppy disks.	Reviews
122 The Winchester Odyssey, From Manufacturer to User by Jim Toreson / A look at drives, OEMs, and the cost of doing business.	190 MPIM II by Stephen Schmitt.
130 Building a Hard-Disk Interface for an S-100 Bus System, Part 1: Introduction by Andrew C. Cruce and Scott A. Alexander / The first in a series of articles on interfacing a Winchester disk drive to an S-100 bus CP/M microcomputer.	247, 248, 251 BYTE Game Grid: Project Nebula by Keith Carlson; Legionnaire by Gregg Williams; Omega Race for the VIC-20 by Stanley J. Wozniak.
152 NAPLPS: A New Standard for Text and Graphics, Part 2: Basic Features by Jim Fleming / How to encode text and simple graphics elements in a standard and efficient manner.	256 Quickcode by Adam B. Green.
218 User's Column: Sage In Bloom, Zeke II, CMOS Traps, Language Debate Continues by Jerry Pournelle / The consummate computer user tackles his new writing machine.	282 Hayes's Stack Smartmodem by Norman C. McEntire.
262 A Faster Binary Search by Dr. L. E. Larson / An important technique results in faster-running applications programs and shorter response times.	
295 Data Collection with a Microcomputer by Dr. Mahlon G. Kelly / Using a TRS-80 Model I for environmental research saves time and money.	Nucleus
310 Build This Memory, Part 1: How to Construct a Low-Cost Memory with 4116 Memory Devices by Cameron Spitzer / Take advantage of the low price of the 4116-type memory.	6 Editorial: The Software Revolution: Where Will We Store All Those Programs?
	14 Letters
	22 BYTE's Bugs
	307, 450 Programming Quizzes: Add Dimensions to Your BASIC; Computing Telescope Parameters with the OS2 Superboard II
	380, 462 System Notes: Circles and Ellipses on the Apple II; Adding a Trace to North Star BASIC
	474 Event Queue
	478, 486 BYTE's Bits
	484 Software Received
	487 Ask BYTE
	490 Books Received
	491 Clubs and Newsletters
	492 BYTELINES
	497 What's New?
	557 Unclassified Ads
	558 BOMB, BOMB Results
	559 Reader Service

FIGURE 4 — Here is the index to one computer periodical. Many of these publications can be found at your local library or in a computer store.

Compilers and Assemblers

Because of the popularity of BASIC language, many micro manufacturers include a BASIC compiler as part of the computer's permanent memory (ROM). Compilers (language translators) for other languages such as FORTH and LOGO are becoming available as software packages which can be loaded into RAM. These software products will enable the programmer to write programs in a variety of languages and dialects in the near future.

Assemblers, on the other hand, are

software which can make the coding and testing of machine language programs much simpler for both novices and professionals. Machine language programming is a specialty field which is considerably more complex than ordinary programming in BASIC.

Graphics

Graphics software makes the printing and plotting of CRT output much more "user-friendly". Some of them allow you to "draw" shapes directly onto the screen while others can display characters not normally found on the standard keyboard.



Andrew Hewson considers a number of problems involving the use of graphics on both the ZX-81 and the Spectrum

Getting larger characters by using a Basic program

CAN ZX-81 characters be printed using POKEs to make them bigger and easier to read? That is what John Kerr of Rochester, Kent asks.

The answer is that there is a method, although it is not necessary to use POKE. The Basic program in table one PRINTs a character at eight times its normal size. The program is rather slow but it serves to illustrate the technique.

Both the ZX-81 and Spectrum construct characters by inking-in relevant squares in an 8x8 grid. No squares are inked-in for the space character, for example, and a star-shaped group of squares is inked-in to form the asterisk. An 8x8 grid is used because the form of each horizontal strip of squares can be stored using the eight bits which form a byte by inking-in a square if the corresponding bit is set to one. Thus eight bytes are used to store the form of each character. The ZX-81 character table is held in the ROM at locations 7680 onwards.

The program works by setting the variable A to the address of the first byte of the character selected by the user. Lines 150 to 270 are the beginning and end of a loop which cycles through each of the eight bytes in turn. The contents of the current byte are loaded into variable B and then compared to 2**7, 2**6, 2**5 and the like in turn.

That is equivalent to testing each of the eight bits. If B is greater than or equal to 2**i, the corresponding bit is set and so the program PRINTs a character. If B is less than 2**i, a space is PRINTed instead. Thus an image of the character is constructed which occupies not only 8x8 PRINT locations.

The Basic program is rather slow to execute and so I have written the machine code routine listed in table two to do a similar task on the 16K ZX-81. The routine can be loaded using a simple hex loader, for example:

```
10 REM AT LEAST 46
11 CHARACTERS
20 FOR I = 16517 TO 16552
30 INPUT Z$
40 IF Z$ = "S" THEN STOP
50 PRINT Z$;
60 POKE I,16*CODE Z$ +
CODE Z$(2)*476
70 NEXT I
80 REM STATEMENT MUST CONTAIN
AT LEAST 46 CHARACTERS BECAUSE THE
```

```
20 PRINT "ENTER A
CHARACTER"
30 INPUT Z$
40 CLS
50 LET A = 8*CODE Z$
60 POKE 16514, A
256*INT(A/256)
70 POKE 16515,
INT(A/256)
80 POKE 16516, CODE Z$
90 RAND USR 16517
100 PAUSE 32768
110 CLS
120 GOTO 20
```

Paul Cooksley, of Dursley, Glos., has a Spectrum. He writes: When I enter POKE 23607,50 the whole character set becomes spooly squarish. Why?

The chapter on the system variables of ZX Spectrum Basic Programming shows that location 23607 contains one fewer than the high byte of the address of the Spectrum character table. The character table is held at 15616 and so locations 23606 and 23607 normally contain 0 and 60 respectively because

0 + 256*(60 + 1) = 15616

Thus, noting that the first true character in the Spectrum character set has CODE 32 not CODE 0 as on the ZX-81, the ZX-81 program in table one can be adapted to run on the Spectrum by substituting

```
130 LET A = PEEK 23606 + 256*
PEEK 23607 + 8*CODE Z$
```

It is also necessary to alter lines 190 and 240 as follows:

```
190 LET E = 2 : 1
240 PRINT CHR$(32);
POKEing a new value into 23607 causes the Spectrum to look in a new place for the eight bytes which determine each character leading to the spooly squarish effect which
```

```
100 PRINT "ENTER A CHARACTER"
110 INPUT Z$
120 CLS
130 LET A = 7680 + 8*CODE Z$
140 PRINT Z$; IS HELD AT
"A": TO "A" = 7
150 FOR I = A TO A + 7
160 LET B = PEEK I
170 PRINT B;
180 FOR J = 7 TO 0 STEP -1
190 LET E = 2**J
200 IF B/E THEN GOTO 240
210 PRINT Z$;
220 LET B = B/E
230 GOTO 250
240 PRINT CHR$(32);
250 NEXT I
260 PRINT
270 NEXT I
```

Table 1. ZX-81 program to PRINT a character at eight times its normal size.

machine code routine is 43 bytes long and it uses another three bytes to hold variables. To load the routine run the hex loader and enter each pair of hex character codes in turn.

To use the routine, retain line 10 of the hex loader and enter the following:

FIGURE 5 — There are plenty of programs and tips found in most computer magazines.
(From Sinclair User)

Voice and Music Synthesizers

By adding the appropriate hardware and software to the computer system, it is possible to create and play back programs which produce audio output. Music can be composed, arranged, and altered into different scales and instruments. With a voice synthesizer, a computer can be taught to speak in any language.

Games

By far the most prolific and popular software on the market are games. These

range from the arcade-style space and shooting games, adventure games and sports, to educational games, mazes and casino games. "Old standards" such as chess, backgammon and checkers are also available.

While listed here last, games do provide a useful function in the microcomputer world. They are a good introduction to keyboards and computers. General computer literacy for children and adults alike is a direct result of game playing. Besides, games are fun!

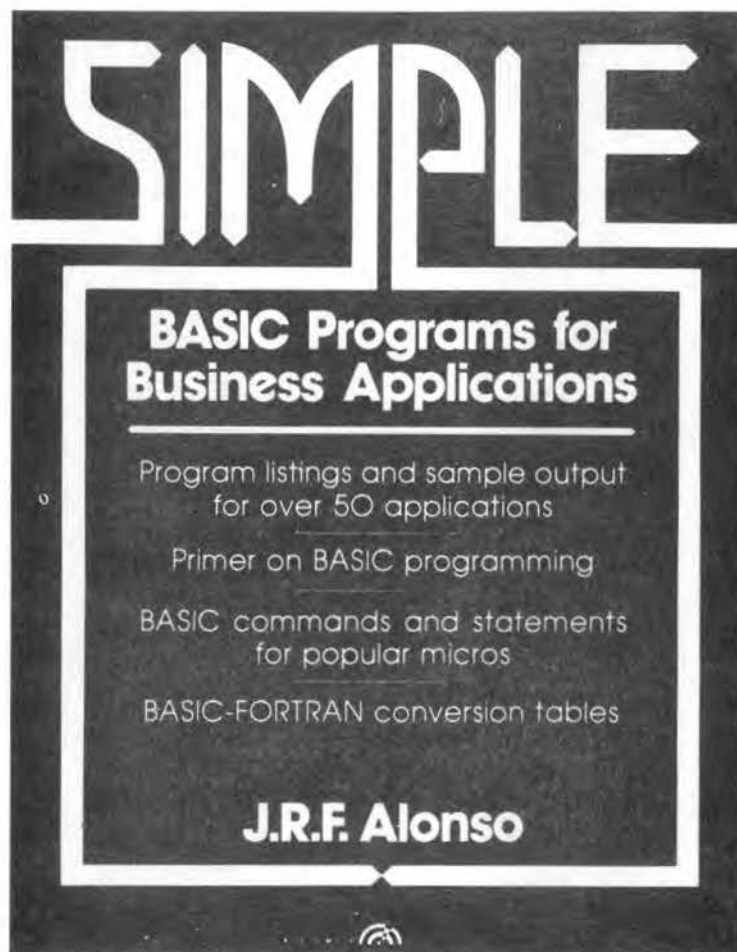


FIGURE 6 — Here is an example of the many inexpensive books of programs on the market. The cost of each program amounts to less than 26 cents.

IDENTIFYING YOUR NEEDS

Before purchasing, writing, or customizing software, you first must clearly define what you want the program to do. Few things in life are more frustrating than trying to work with a program that provides too much or too little information.

It is worth every bit of time and effort invested to analyze your requirements or the needs of your customer. Write the specifications down! Give some thought to the amount of data you will have to enter, what data you have to store, and how much time the program will have to run. These factors often determine the language in which the software will be written. For example, a program which keeps an appointments schedule need not run extremely fast and could be written in BASIC. However, an arcade-style space game should be written in machine-code which will execute much faster than BASIC.

Once you have clearly stated the needs, many factors must be considered when attempting to meet them.

The best software is, generally speaking, the software that you write yourself. It will do *exactly* what you want it to do. It is also the cheapest way to acquire a program in terms of capital outlay. However, it will certainly take a considerable amount of your time, depending upon the language it is to be coded in, your programming skills and the complexity of the software.

If you can find software already written which closely meets your requirements, it would probably prove to be more cost effective to purchase it directly. However, this method is not nearly as personally satisfying as creating it yourself!

SURVEYING THE MARKET

A good second step in making software acquisition decisions is to shop around to see if what you need is already available. There are many sources for such information,

including software catalogs, computer stores and computing magazines.

CASSETTE AND DISK PACKAGES

The easiest way to acquire software is to purchase computer compatible programs already on a cassette or disk. These are available for every sort of application. There are games, business bookkeeping and home management programs.

The least expensive programs on cassette or disk may or may not be user-friendly. Some have no printed instructions and very few menus and prompts. The most expensive, however, such as Wordstar or Visicalc come with a large user manual and many prompts. Programs can cost as little as \$4.50 or as much as \$600.

Whenever possible, review the user manual *before* you buy the product. A good rule of thumb to follow is:

The more clearly written and illustrated the manual is, the more user-friendly the software will prove to be.

Don't be afraid to do some comparative shopping. Price ranges and capabilities differ greatly. Software is often priced according to what the market will bear rather than according to the development costs involved.

Make sure that your system is capable of running the software. Some software may require additional memory or expensive peripheral devices, such as a color monitor, a printer, etc. A \$15 software package may not turn out to be very cheap, if you have to buy a \$1,000 printer to run it.

On the other hand, some software may prove to be incompatible with your system. Be sure to check with the software dealer or computer manufacturer before you make your purchase. If you can examine and run the software on approval, this will minimize your buying of "useless" programs. Perhaps a nearby computer store will even demonstrate it in the shop using your configuration.



FIGURE 7 — This publication has grown to become a major source of information for SINCLAIR users. It is not, however, connected in any way with the TIMEX SINCLAIR or Sinclair Research Ltd. companies.

(From Sinclair User)

SOFTWARE IN PERIODICALS

Some magazines run regular columns featuring software reviews. Your public library may be a good source for back issues. Most types of popular computers have user groups around the country. Some publish magazines or newsletters while others may have regularly scheduled meetings. Users exchange information about software and how it works. This is an excellent way to find out about the quality of available software before actually buying it.

SOFTWARE BOOKS

Before deciding that writing your own software is the best option for you to take, one other source should be considered. There are many programmer's books on the market which provide complete line-by-line listings of programs. You simply keyboard the program into your computer and save it onto tape.

For the price of one programming book (\$2.50 up to \$25.00), you might be able to add several programs to your collection. Another advantage of acquiring software in this way is that you will have no trouble listing the program and making changes to it to suit your own or client requirements. These programs may also give you some interesting subroutines and efficiencies which you may add to your own coding repertoire.

WRITING YOUR OWN

If the software you want is not available, you have little choice other than to develop it yourself. But don't despair! Besides being a very satisfying experience, you will be left with a product which meets your needs, exactly. And, who knows, you may have come up with a better mousetrap! If your product is good enough and unique in its design or application, you may be able to sell it for a handsome profit.

When you are ready to begin the software development process, keep one primary thought in mind:

DON'T BE IN A HURRY TO CODE!

Regardless of the time-pressures or your enthusiasm to begin, there are no shortcuts to successful programming. Always keep in mind the program development cycle:

- Analyze your needs
- Design the specifications
- Flowchart your program solution
- Code from your flowchart
- Test and debug your code thoroughly
- Keep up-to-date documentation

Unless you know what you want the program to do, valuable time will be wasted "stumbling around" in the dark. There is a real difference between solving the programming assignments in your lessons and tackling a self-designed program. In your Study Units, the specifications were given. When meeting user needs, however, you must draw up your own specifications.

There is no "perfect" method for doing this. Here is a suggested approach. Start by designing the output. Sketch the screen or screens that you would like to have displayed. Since most good software is menu-driven, the CRT display of the menu should appear pleasing to you.

Next, think about the input. Since you probably will be the one to do the data entry, ensure that you won't have to input too much or too little data. Format your prompts so that they will be easy to follow. After all, you don't want to have to consult your user's manual too often to know what to enter into your own program!

Introducing...the Byte Book Club

FORMERLY COMPUTER PROFESSIONALS' BOOK CLUB

MICROCOMPUTER GRAPHICS AND PROGRAMMING TECHNIQUES. By H. Katzan, Jr. 240 pp., 100 illus. and tables. Here's a stimulating introduction to computer graphics for small computers. It covers all the advances to date in color coding and computer graphics technology and—best of all—it's written for information professionals who can't draw! Includes actual graphics programs worth hundreds of dollars! 582576-7 \$18.95

COMPILER CONSTRUCTION: Theory and Practice. By W. A. Barrett and J. D. Couch. 661 pp., illus. Everything its title promises! An excellent introduction to the world of automatic translation, this is a mix of mathematical foundations of compilers and the practical considerations required in developing high-quality compilers for commercial release. 788/499B \$25.95 (Counts as 2 of your 3 books)

MICROCOMPUTER INTERFACING. By B. Artwick. 789/436B \$28.00 (Counts as 2 of your 3 books)

AN INTRODUCTION TO VISI-CALC® MATRIXING FOR APPLE® AND IBM®. By H. Anbarlian. 252 pp., illus., softcover. Enables you to use VisiCalc matrices—also known as templates and models—to put your Apple or IBM personal computer to productive use almost immediately. It describes the actual process of developing matrices for such applications as expense vouchers, price/earnings ratios, payrolls, stock portfolios, and more. 016/054 \$22.95

THE PASCAL HANDBOOK. By J. Tiberghien. 582365-9B \$35.00 (Counts as 2 of your 3 books)

THE SCIENCE OF PROGRAMMING. By D. Gries. 582452-3 \$19.80

SOFTWARE ENGINEERING: A Practitioner's Approach. By R. S. Pressman. 576 pp., 180 illus. Gives you a concise but complete picture of each step in the software engineering process—a set of techniques that deal with software as an engineered product. Each step is discussed and illustrated—from planning, analysis, and design to implementation, testing, and maintenance—to show exactly what's involved. 507/813B \$32.95 (Counts as 2 of your 3 books)

ASSEMBLERS, COMPILERS, AND PROGRAM TRANSLATION. By P. Calingaert. 582110-9 \$22.95

MINICOMPUTER AND MICROPROCESSOR INTERFACING. By J. C. Cluley. 266 pp., 73 illus. and tables. Unless you are content to have your information processing system simply talk to itself, you need the intense coverage of interfacing provided so brilliantly by this compact volume. In addition to discussing the logical design of interfaces assembled from small-scale integrated circuits, the book gives you a lucid picture of the interface packages designed for microprocessor systems and the way in which they are used. 582585-6B \$27.50 (Counts as 2 of your 3 books)

POWERFUL TOOLS! POWERFUL SAVINGS! \$1.00

Take any 3 books for only 1 each* Values up to \$75.00



BIT-SLICE MICROPROCESSOR DESIGN. By J. Mick and J. Bick. 398 pp. All in one place—the crucial information you've been needing about the 2900 family of bit-slice microprocessor components. This remarkable "first" designs right before your eyes not just one but two complete 16-bit machines! 417/814B \$29.50 (Counts as 2 of your 3 books)

MICROPROCESSOR APPLICATIONS HANDBOOK. Edited by D. F. Stout. 472 pp., 284 illus. This BIG book on SMALL chips will help you make your systems timely, versatile, and cost-effective. The 16 expert contributors provide in-depth treatments of both hardware and software so you can completely analyze, design, construct, and program. 617/988B \$35.00 (Counts as 2 of your 3 books)

PROGRAMMING WITH ADA: An Introduction By Means of Graded Examples. By P. Wegner. 789/24X \$17.95

THE SMALL COMPUTER CONNECTION: Networks for the Home and Office. By N. L. Shapiro. 256 pp. Shows you how to use existing hardware and software to link your small computer to other computers—large and small—and to a vast universe of databases. From stock market quotations to using interactive "chat modes," you'll learn how to use today's giant information utility services. 564/124 \$16.95

THE SOUL OF A NEW MACHINE. By T. Kidder. 582439-6 \$13.95

THE DEVIL'S OP DICTIONARY. By S. Kelly-Boote. 340/226 \$8.50

ELECTRONICS ENGINEERS' HANDBOOK, 2/e. By D. C. Fink & D. Christiansen. 209/812A \$75.00 (Counts as 3 of your 3 books)

SOFTWARE DEBUGGING FOR MICROCOMPUTERS. By R. Bruce. 582075-7 \$18.95

Z80 USERS MANUAL. By J. Carr. 326 pp., with diagrams, charts, and tables. Takes you through every opportunity the ZAP can offer! It covers Z80 pin definitions, CPU control signals, support chips, interfacing peripherals, and much more. It also includes a 177-page Z80 instruction set so you can study the instructions on a one-by-one basis. 582336-5 \$21.95

ELECTRONIC GAMES. By W. H. Buchsbaum. 087/210B \$26.95 (Counts as 2 of your 3 books)

COMPUTER PERIPHERALS FOR MINICOMPUTERS, MICROPROCESSORS, AND PERSONAL COMPUTERS. By C. L. Hohenstein. 294/518 \$21.90

A PROGRAMMER'S GUIDE TO COSOL. By W. J. Harrison. 789/789 \$18.95

MICROPROCESSOR DATA BOOK. By S. A. Money. 350 pp., 220 illus. A truly awesome collection of data about virtually every chip available today! International in scope, the book provides information from a wide range of American, European, and Japanese manufacturers. A common format enables you to analyze each device's capabilities and compare it with other devices. 427/062B \$35.00 (Counts as 2 of your 3 books)

FIGURE 8 — Computer book clubs offer excellent discounts on books. Certain basic books can be obtained in this manner at great savings. One problem, however, is that many books soon become outdated by the time they are in print. Technology is moving too rapidly for book publishers to keep abreast of developments.

(From Byte ®)

Only after you have the input and output fully defined should you move on to the next step — preparing the flowchart. Flowcharting is the step-by-step design of the processing required to get from the given input to the desired output. Therefore, no amount of effort and time should be spared here.

The flowchart should be detailed and accurate. Solutions will *not* present themselves during coding. Problems must be identified and resolved *before* any coding begins. Don't hesitate to walk through your flowchart using test data. Restructure it whenever bugs are identified.

The coding phase of program development only deals with the translation of the flowchart into BASIC language. If the logic has been handled properly in the flowchart, the only problems encountered with coding should be syntax errors.

Using good programming techniques and stub testing, the testing and debugging phase should proceed in a careful and deliberate manner.

Design, code, and test the program module by module. Proceed to the next and more detailed modules only after satisfactory results have been obtained.

If logic errors have been detected or, if enhancements to the software are desired, don't immediately apply them to the code. Go back to the analysis and design phases. In other words, think them through and make changes to your flowchart *before* altering your program.

Years of practice and experience have proven the worth of this rule:

The more time spent in design and analysis, the less time will be spent in coding and testing.

You will discover that clearly expressed, efficiently coded programs are much easier to maintain than those which are poorly designed. And certainly, efficiently coded software is much easier to modify in the future, too.

Once your software works, prepare yourself a user manual describing all the prompts, RUN procedures (whether to use the RUN command or a GOTO command to execute the program), and how to handle any error conditions that may arise. Don't kid yourself into believing that you'll be able to remember the program idiosyncracies forever; you'll find that soon afterwards, it may seem as if someone else wrote it!

Keep the specifications, flowchart, program listing and documentation in a safe place. And, don't forget to make several copies of your working program. You wouldn't want to let one defective tape or loading error destroy all of your hard work!

CUSTOMIZING SOFTWARE

Another approach to acquiring needed software can be taken when you find a program on the market which closely matches your needs. You then make alterations to the software to fit your requirements. This modification process is also known as customizing. Maybe you need to change the values of a few variables to increase the dimensions of a table or to add a few calculations. A systematic process should be followed here as well.

First, you must obtain a listing of the program. This should not be too difficult as long as it is written in BASIC. (If coded in machine-language, this may be undesirable or, at the very least, impractical.) You can't get a listing, however, unless you can interrupt the program or get a report code to appear at the bottom of the screen.

After you load the program from tape, merely list it. If the program runs itself

BUSINESS

Store-Inventory Software for the Atari

A cash-register inventory system for merchants

by John Edwards

A retail-business inventory system for Atari personal computers? That's a surprise. After all, every body knows the Atari 400 and 500 are game machines.

Prejudices die hard, especially in the computer industry. People like to lump machines into neat little categories. Sure, the Atari do a fantastic job of pulverizing asteroids and expelling invaders, but such machines are also full-fledged microcomputers, capable of supporting almost any application a businessperson could demand.

I can't understand why so many people feel Atari are just game machines. Perhaps it has something to do with their excellent, high-resolution graphics capability. But wait! Is the Apple II and IBM Personal Computer also have outstanding graphics, and nobody thinks them "game computers." Whatever the cause for this prejudice, it's wrong-headed, and a program like CRIS (Cash Register Inventory System) is the

traditional cash register. The documentation is straightforward, simple, and relatively jargon-free, making few assumptions about your computer background. The program itself is neatly organized and employs a series of easily understood menus and prompts. Its use of passwords during particularly tricky procedures helps to keep you from inadvertently destroying data.

My Fantasy
While reviewing this program, I experienced a strange fantasy. Suddenly I was back in the year 1999, attending the electronics trade show they held every spring at the New York Coliseum. I've cut a day from high school, as I traditionally did for the occasion, and with my best friend I've sat in the aisles of wonder. Every thing is as it was, except this time I'm carrying an Atari 500, a video monitor, and a copy of CRIS. At the main at the Hewlett-Packard exhibit begins showing off his

- storage capacity of over 1000 separate inventory items
- ability to list up to 100 items
- a user-defined code that can be invisible to salesperson
- automatic discount quantity
- calculation of totals and change
- generation of end-of-period sales report
- calculation of taxable items

Such software is an example of the bringing the computer right to the door merchant.

Using the System
Once you're logged in, you have a grant, CRIS first a backup of the in-printed! Rocking trend aimed at from piracy. I have to pay or to backup—so long to make your own. Next, CRIS is the steps of creating which to store (I inventory items complete this

UPDATES

CRIS has a built-in update system that allows you to update your inventory items without having to re-enter them. The system will automatically update your inventory items when you enter a new item. This is a very useful feature, especially if you have a large inventory. The system will also allow you to update your inventory items when you enter a new item. This is a very useful feature, especially if you have a large inventory.

SOFTWARE AND SERVICES

RELATIONSHIP BANKING

The Relationship Banking System (RBS) is a service that links money market funds, foreign investments, debt funds, loan management, and other real banking services. RBS uses this system may be any or all of the available features of the system in keeping with their particular customer and market needs. Customers of these banks can choose any or all of the features offered by the bank based on their personal banking needs.

The system operates on a remote processing basis, using terminal pointers and/or on-line access to each bank and index to one of the bank's data centers at Wayne, Pa., or Culver City, Calif. Each bank's installation includes a balance transfer system that communicates to the vendor information about stock and bond accounts, debit cards, and also for bank operations and reporting. This software is operating system dependent, written for each

processing. The system is totally computerized to users.

Capital is determined as a set of standard financial management. While consultation does not require a total system purchase, a programmer or analyst is needed who is familiar with the computer/terminal system, if the user system and low cost functions. It is priced at \$4,000, with maintenance offered at \$450 a year. (VOTRO DATA CORP., Minneapolis, Minn.)

FOR DATA CIRCLE 327 ON READER CARD

MULTITASKING ON IBM PC

The Quixote operating system can simultaneously handle up to eight users and up to 250 tasks. The system contains the full screen text editor, which can be run in either in monochrome or in color. It also contains the text formatting program, etc. Also included in the operating system is a hierarchical file structure that allows the user to file program material by name, a file structure, and a directory

POPULAR REVIEWS: SOFTWARE

with all bare of equal height. However, the Audio Spectrum Analyzer showed a spurious peak at around 2000 Hz with both test signals. Nevertheless, the demanding audiophile could still make use of the system by adjusting for this anomaly in frequency response.

How Useful Is It?

For system testing, the Spectrum Analyzer can give you a visual indication of the frequency balance or fidelity of your hi-fi system at any given moment and provides finer resolution of the frequency details than most home RTAs. Though it does not cover the full frequency range, it covers most of the high range and offers full coverage of the lower frequencies where you're most likely to need sound balancing. But the Spectrum Analyzer's automatic gain calibration greatly limits its use as a precise test instrument. Provision for setting the gain manually would greatly increase the Analyzer's value.

The Spectrum Analyzer's cost—even if you had to buy the Color Computer—is still lower than that

of any other RTA that measures bands one-third octave wide. Of course, most consumers aren't going to rush out and purchase a Color Computer just to use software this specialized. But the audiophile who already owns a Color Computer can now buy a good RTA for only \$19.95.

Every hi-fi buff is a fan-letter at heart, and there's no denying that

the Spectrum Analyzer is a lot of fun. In the kaleidoscope world of color, a low-cost color of with added capabilities such as freeze-frame. In the graph of the correspondence between the display is absolutely mesmerizing. If you're the kind of person who likes to auto a Mahler symphony, the Audio Spectrum Analyzer is well worth investigating.

EDUCATION

The Learning System

Make your own computer-based tests

by Robert Moskowitz

The Learning System is a test-generating program intended to help instructors provide automated testing for a wide range of learners. The program lets an Apple computer manage some of the rote aspects of the learning process, leaving the instructor free for other, less routine kinds of work.

The program is ingenious, user-friendly, and well put together. It comes with both Master disks and Player disks. (I think the latter might be more appropriately titled Learner disks.) When you boot the system with the Master disk, you have full access to any of the stored tests, answers, hints, and other information previously established under the system, including student records. But when you boot the system with the Player disk, you can access the information only in preset combinations for instruction or testing, and you have no access to student records. For additional system security, student records are stored on separate, dedicated disks so you can ensure their privacy.

This multitask method of controlling The Learning System's information means that a single teacher can manage automated instruction for any number of

learners, and each learner left alone with an Apple for instruction, testing, or both. Unlike a learner is a whole of a program there's virtually no way to a test or to alter any system's records.

Running the System

The Learning System all its own DOS 3.3 store. To get started, you must install selection from menu and set up at least for tests and another for like other Micro Lab. The Learning System is a number of program modules loaded automatically by the program and C with either single or C systems. The main advantage of the system is simply down on disk switch way, the computer program appropriate disk and C drive in a friendly manner. During initial sample, you see on the screen: "This will take 10 seconds. Go get your coffee. I'll beep when I'm done." Later, the screen reads: "Please insert disk in drive 1." If you insert the wrong disk, you see: "That's the Record the Program disk."

organized so this is certain to show consistent profits.

And then there's the old-but-true idea that most people believe whatever they see in print. For some reason, statements and figures that would be questioned, even challenged, during an ordinary negotiating session are swallowed whole without demur when presented in the form of a computer projection. Without exception, no one ever remembers back exactly what we put in.

The benefits of these discoveries cannot be overemphasized. We have experienced shorter negotiating sessions and fewer arguments, and we've made more favorable deals and fewer mistakes. We have even had the unprecedented experience of hearing an agent offer to reduce his commission in order that we might make our necessary profit percentage.

At the same time we were discovering the joys of computer bargaining, we found something in and of itself justified the purchase of the financial modeling program. The funding for our projects comes almost exclusively from participating investors. One of our first jobs after deciding on a particular project is to form a partnership and sell shares in that venture. Although this has been relatively simple in the past due to our fairly respectable track record, we found recently that potential investors were lining up, checks in hand. The reason for this sudden flurry of interest was none other than our faithful friend, the computer. With it we were able to fully inform investors about what they could expect from an investment—necessary cash outlay, rate of return, and tax advantages. For the same reasons that the printouts made our real-estate negotiations easier, they also convinced investors that our projects were well worth their interest.

Similar financial modeling programs are available for personal computers at prices most small

businesses can afford. If your firm is planning to purchase a small computer or additional software, be sure the products serve your company's needs. Once your pro-

gram has become operational, you will start to discover what a marvelous negotiating tool your small computer can be.

—Patricia C. Roberson

RANDOM ACCESS

Mailing List Programs Made Simple

A mailing list program is for everybody. Maybe the biggest mailing you do is the annual Christmas list, or perhaps you have a thriving mail-order business with thousands of customers. No matter—a mailing list program can help you immeasurably in both your personal and business correspondence.

If you think that a mailing list program is only for keeping track of a few names or addresses, you're in for a surprise. A good mailing list program can be used to store and retrieve all sorts of information, from data about hobby collections to facts about employees.

A well-designed mailing list program can serve as a specialized database for the knowledgeable user," says Miers. Productions' Richard Wilson, author of a recently released mailing list program. "You can use a mailing list program as a simple file manager that can do much more than just print labels or keep track of phone numbers—provided that it's flexible enough and allows users to define their own special needs."

When you go searching for that ideal mailing list program, you'll discover a wide variety of choices. Because mailing list programs are relatively easy to write, many of them are on the market.

So what should you look for in mailing list software? What criteria do you use to select a program that fits your needs and will get the job done?

If you've never used such a program, you may be completely in the dark about mailing list software. In that case, let's start at the beginning with a description of how these programs work.

The most basic operation of a mailing list program is entering names and addresses into a list. One such address entry is called a record. A record is simply the collection of related pieces of information (name, address, zip code, phone number, etc.) about a single person or thing.

These pieces of information in a record are stored in fields. A field holds a specific piece of information, like a phone number or zip code.

So a mailing list program works with records (or entries) that have a certain number of fields (or pieces of information). The most basic aspect of a mailing list program is how it handles these fields of information. For example, a mailing list program may allow only four fields per entry. In such a case, there is no room for additional information beyond those four fields.

Most mailing list programs offer 10 to 15 fields per record, which means that you can store from 10 to 15 pieces of information about each entry. Make sure, however, that the program gives you as much flexibility and control over these fields as possible.

Laura Hickman rates a computerized diet analysis service, and a mailing list program was one of the

FIGURE 9 — Reviews of software in periodicals can give the programmer insights as to how other programmers are meeting user requirements. There are plenty of useful ideas and "how-to's" presented.

(From Popular Computing T.M. and Datamation ®)

without the need of a RUN or GOTO command, then you should hit the BREAK key at a time when the computer is "busy" with some calculations. Unless you have a printer, you won't be able to see all of the coding at one time. Therefore, you should take the following steps:

- Copy the program onto paper, very carefully, line by line. (If you have a printer, you can omit this step.)
- Once again, don't be in a hurry to alter the code. As you know by now, one small change in a program can completely destroy its accuracy and effectiveness.
- Design a flowchart from the code. This is the reverse of the process that you would normally take in writing your own program. But it is much easier to see how to alter a program when the entire logic is before you.
- Research any coding lines which seem unfamiliar. You can't effect any changes until you know how it works to begin with.
- Walk through the program logic before you make the change. Then, walk it through again. This time, you will review the changes you are going to make in the context of the program.
- Once you are satisfied that you know how the original works and how your changes will alter it, you are ready to actually insert, change and delete program statements.
- Test the modified program thoroughly before you actually use it. Some bugs are sneaky and may remain hidden. These may cause the program to blow up at the most inopportune time.
- Keep good records of the modifications you have made. Should you decide to make more changes at a later date, it will be quite easy to refer to clean documentation.

DUPLICATING YOUR SOFTWARE

Customized software or programs designed "from scratch" often can be sold to more than one client. Suppose, for example, that you created an accounting program for a landscape gardener. Upon demonstrating this program to other gardeners in the community, they also want to purchase the software. Now the question is how to provide copies to your customers.

Loading reasonably short programs onto cassette tapes and checking them for bugs is not a difficult task using a standard tape recorder. You can furnish quite a number of tapes to clients in this manner. Perhaps you have a teen-ager who would like to earn extra money duplicating tapes in this fashion for you.

There are many entrepreneurs who duplicate up to 100 tapes per week using their home equipment. After checking, the tapes are mailed to clients in protective envelopes or delivered personally.

However, once you really get into selling your own software, you will require the services of a tape duplicating company. Such a company will furnish any number of tapes you need — from 100 to 100,000. Duplication is accomplished by using a multiple head, high-speed machine. It can record a 30 minute program on 36 cassettes simultaneously in four or five minutes.

Tape duplication companies usually offer a variety of tape grades and qualities upon which to record your program. Although you don't need the very best tape, be sure to duplicate on tape which is known to be reliable. Attempting to save money by selecting cheaper tape can result in client complaints and loss of business.

Cassette quality is a topic you should discuss at length with your contact at the duplicator. In addition to the mill and general tape quality, the mechanical feed wheels in some brands are rough and cheaply made; these tend to bind, skip and break. These cassettes can also harm the recorder.



**SOFTWARE CENTRE
SOFTWARE '83
SOFTWARE CENTRE
SOFTWARE '83
SOFTWARE CENTRE
SOFTWARE '83
SOFTWARE CENTRE
SOFTWARE '83**

FIGURE 10 — Several companies offer catalogs of software in the form of packages with full support, limited support, and program manuals only. Orders can be made by mail and by telephone. Program price lists found in the catalogs also give you a good notion about what you can charge for programs you have developed.

VISIBLE COMPUTER SUPPLY CORPORATION

A Subsidiary of Wallace Computer Services, Inc. 1615 S. Stockton Street, Lodi, California 95241

1982 GENERAL CATALOG

Fall/Winter Edition

*"The complete
source for all
your computer
supplies and
accessories"*

NEW FALL
EDITION ...
OVER 150
NEW ITEMS
INSIDE

SEE INDEX ON PAGE 163



CRT WORK STATIONS AND SUPPLIES



BINDERS AND BINDER STORAGE



DATA COMMUNICATION



WORD PROCESSING



LABELS AND PRINTER RIBBONS



MAGNETIC MEDIA

FOR FAST SERVICE CALL 209-334-9487

FIGURE 11 — Stationers, office supply dealers and computer distributors can provide you with catalogs for every supply and accessory you can imagine. Flowchart pads, graphic display pads, and other programmer's supplies can often be ordered from a catalog at discount prices.

PACKAGING THE CASSETTE

Most duplicating companies offer two or three options in packaging the cassette. Least expensive is the "shrink-wrap" process whereby the cassette is sealed within a thin plastic membrane. This is fine for shipping to customers because it does keep soil and dust away from the tape. Once opened by the client, the tape must be protected in some other way.

A flexible plastic case allows greater protection and gives the user no excuse for not keeping the software out of harm's way. The case can be labeled and stacked along with other tapes.

A brittle plastic case is also available. This provides maximum protection against accidents. This case is also large enough that you can include any brief instructions in printed form inside the lid.



FIGURE 12 — Cassettes are inexpensive vehicles for dispensing software on tape. They can be mailed easily, too.

LABELING YOUR SOFTWARE

Even though you may not at this time be ready for the services of a high volume tape duplicator company, you may want to order some cassette labels there. They can provide cassette labels in any colors with whatever imprinted designs and titles you want.

Starting out, it is suggested that you merely buy the labels without printing and type your own titles. At least this is more professional than using some other sort of label and handwriting the contents of the tape across it.

Even the typewritten label can and should look neat and professional. It should include such things as the following:

- * Title of Program
- * Number of Cassette (if more than one in program series)
- * Side of Cassette (A or B)
- * Sub-Program Contents (by major heading)
- * Author's Name (optional)
- * Copyright Notice, Date
- * Copyright Holder, Address
- * Edition Number

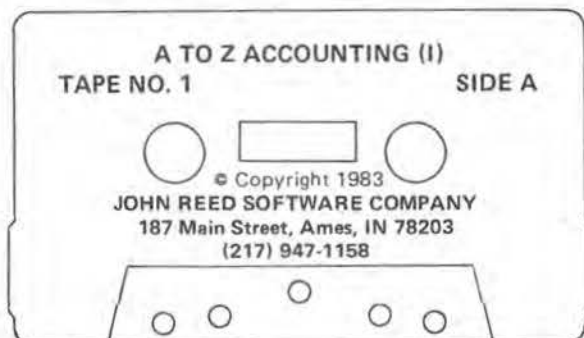


FIGURE 13 — This is an example of how to label program cassettes you have produced for public distribution.

PROTECTING YOUR CREATIONS

Under the new copyright laws, there is greater protection than ever before against the theft of another's products and publications. On the other hand, the explosion of software on tape and disk has raised new issues never before covered by copyright law. For example, how do you prove in a court of law that a game you created on your very own — without help from any source — was not stolen from a software company which has been manufacturing an almost identical item? How can you keep someone from taking your idea and "customizing" it sufficiently and then selling the new version before you get yours to market?

Well, these are issues which the courts can best decide. The important thing, however, is to apply for copyright each time you publish a software package. The forms are easily filled out. The cost of copyright is nominal. You can file a set of tapes with the copyright office, and you are protected against theft of your program. The printed copyright notice on each cassette label serves notice to those who would either steal the contents for profit or otherwise duplicate the tape contents for their own use.

The matter of copying software without permission of the publisher (you) is very serious. The person to whom you sell a software package cannot duplicate your program more than what is required to use it in the manner specified. In other words, your client cannot buy a program from you and then provide three friends with duplicate copies for their own use. This is illegal.

Some software companies are even taking the precautions of adding built-in program devices which limit the use of their creations. At least one major software producer "leases" the use of software and checks the amount of use via a counter within the software itself. Another company offers its software by the year, setting rental fees according to demand.

Major software manufacturers are also beginning to warn buyers of used computer and software equipment against using second-hand programs. For example, if you purchased a small computer and accompanying software from a friend, you may not have any right to use copyrighted software included in the bargain — even if you paid for it. The reason is that the rights for this property continue to reside with the publisher and not the second buyer. To legally use the software which came with your friend's computer, you would have to contact the software publisher and request permission to use it. Normally, such permission is granted when you agree to pay a certain percentage of the original purchase price (which may be 100%).

As you can see, the matter of copyright and software is an issue which is only now beginning to receive attention of authorities, manufacturers and users. If you are seriously considering creating your own software or customizing another's for resale and profit, you must take all precautions in protecting your own creations and those of others. And, for gosh sakes, don't try pirating someone else's materials for any reason. The penalties are too high!

COPYRIGHTING USER PUBLICATIONS

The copyright protection extends to all parts of your creation, including documentation and user materials. Each printed item ought to bear the same copyright notice, title, and other identification that appears on the cassette labels. Copies of the printed materials are submitted to the copyright office at the same time you originally request copyright protection.

And speaking of providing user manuals and directions for installing software, let's keep in mind the person who will be opening your software package for the first time. Have you really done the best job of explaining how to use your materials?

APPLICATION FOR COPYRIGHT REGISTRATION

for a
Nondramatic Literary Work

FORM TX

UNITED STATES COPYRIGHT OFFICE
LIBRARY OF CONGRESS
WASHINGTON, D.C. 20559

HOW TO APPLY FOR COPYRIGHT REGISTRATION:

- **First:** Read the information on this page to make sure Form TX is the correct application for your work.
- **Second:** Open out the form by lifting on the left. Read through the detailed instructions before starting to complete the form.
- **Third:** Complete spaces 1-4 of the application, then turn the entire form over and, after reading the instructions for spaces 5-11, complete the rest of your application. Use typewriter or print in dark ink. Be sure to sign the form at space 10.
- **Fourth:** Detach your completed application from these instructions and send it with the necessary deposit of the work (see below) to, Register of Copyrights, Library of Congress, Washington, D.C. 20559. Unless you have a Deposit Account in the Copyright Office, your application and deposit must be accompanied by a check or money order for \$10, payable to: *Register of Copyrights*.

WHEN TO USE FORM TX: Form TX is the appropriate application to use for copyright registration covering nondramatic literary works, whether published or unpublished.

WHAT IS A "NONDRAMATIC LITERARY WORK"? The category of "nondramatic literary works" (Class TX) is very broad. Except for dramatic works and certain kinds of audiovisual works, Class TX includes all types of works written in words (or other verbal or numerical symbols). A few of the many examples of "nondramatic literary works" include fiction, nonfiction, poetry, periodicals, textbooks, reference works, directories, catalogs, advertising copy, and compilations of information.

DEPOSIT TO ACCOMPANY APPLICATION: An application for copyright registration must be accompanied by a deposit representing the entire work for which registration is to be made. The following are the general deposit requirements as set forth in the statute:

Unpublished work: Deposit one complete copy (or phonorecord).

Published work: Deposit two complete copies (or phonorecords) of the best edition.

Work first published outside the United States: Deposit one complete copy (or phonorecord) of the first foreign edition.

Contribution to a collective work: Deposit one complete copy (or phonorecord) of the best edition of the collective work.

These general deposit requirements may vary in particular situations. For further information about copyright deposit, write for Circular R7.

THE COPYRIGHT NOTICE: For published works, the law provides that a copyright notice in a specified form "shall be placed on all publicly distributed copies from which the work can be visually perceived." Use of the copyright notice is the responsibility of the copyright owner and does not require advance permission from the Copyright Office. The required form of the notice for copies generally consists of three elements: (1) the symbol "©", or the word "Copyright", or the abbreviation "Copr."; (2) the year of first publication; and (3) the name of the owner of copyright. For example: "© 1978 Constance Porter". The notice is to be affixed to the copies "in such manner and location as to give reasonable notice of the claim of copyright." Unlike the law in effect before 1978, the new copyright statute provides procedures for correcting errors in the copyright notice, and even for curing the omission of the notice. However, a failure to comply with the notice requirements may still result in the loss of some copyright protection and, unless corrected within five years, in the complete loss of copyright. For further information about the copyright notice and the procedures for correcting errors or omissions, write for Circular R3.

DURATION OF COPYRIGHT: For works that were created after the effective date of the new statute (January 1, 1978), the basic copyright term will be the life of the author and fifty years after the author's death. For works made for hire, and for certain anonymous and pseudonymous works, the duration of copyright will be 75 years from publication or 100 years from creation, whichever is shorter. These same terms of copyright will generally apply to works that had been created before 1978 but had not been published or copyrighted before that date. For further information about the duration of copyright, including the terms of copyrights already in existence before 1978, write for Circular R15a.

FIGURE 14 — This copyright application form would be used for user manuals and other printed materials — including printed versions of software. Other forms are used for cassette tapes. All forms are available by writing United States Copyright Office, Library of Congress, Washington, D.C. 20559.

DEBUGGING YOUR PRINTED MATERIALS

Once you have gotten all the bugs out of your completed program and identified all the potential problem areas, be sure to devote ample time to user instructions. If you look at some of the many well-known program manuals on the market today, you will be amazed to discover how unreadable, incomplete, and redundant they are. Nobody took the time to smooth out all the wrinkles and "debug" the documentation. The manuals are, in many instances, anything but user-friendly.

You can be one leg up on your competition by providing clear, concise, easily understood directions for how to install and use your program. Take your documentation and make it easy to comprehend. Spend time pruning it down, using simple, honest words. Don't talk in jargon. Then, when you believe you have directions anybody can understand, give a computer novice friend one of your cassettes with the directions tucked inside the case. Without any further direction from you, see whether your friend can boot up and use the program.

If your friend has difficulty, pinpoint where the problem is occurring and correct it by changing the directions. Instead of explaining, find out why your friend is having a problem. After rewriting, try it out on your friend again. Then, try it out on another friend until such time as your documentation and your program on tape can be successfully installed without outside assistance or training.

LICENSE AGREEMENTS

The number of display and classified advertisements in computer magazines attest to the many entrepreneurs who are offering software via mail order. Perhaps you will want to sample some of these either for your own applications or those of customers. You

may discover a software package which you would like to include in your own list of offerings to clients. You may find that such a program is precisely what your customers require. Negotiations with the publisher may be in order.

If you believe you have a market for someone else's software, by all means contact the publisher and see what can be worked out. It is likely that the publisher will consider making you a local distributor for the software on a percentage commission basis. You may be able to negotiate an exclusive license agreement whereby you are the only distributor of this software within a certain prescribed area.

Handling software for other programmers and publishers as well as producing your own serves many purposes. You are able to earn money installing programs which may be much better known than your own. Identifying yourself with a larger assortment of software adds credibility to you and your own software. You are better able to meet customer needs by offering a larger software choice. The experience of selling and installing existing programs will provide additional confidence for when you are selling clients on your own programs.

Always keep your eyes open to new software packages being offered in the publications. When you are certain there is a "hot" new item never before offered which is destined to fill a sizable need, then seek to learn all you can about it. Write for information, explaining that you are interested in receiving all particulars. See if you cannot acquire a sample. Ask about hardware requirements.

And when new hardware becomes available, study the possibilities for expanding software to meet the computer's greater capabilities. Ask yourself how this new model can serve a given population, if new software were produced. There is nothing more exciting than checking out a new computer which has great power and potential for problem solving!

SOFTWARE IN PERSPECTIVE

It has been suggested by several experts that the next great revolution within the computer industry will be in software. During the next decade, programmers will be exploiting software applications in every conceivable way. There will hardly be any area of life untouched by programs and computers.

New and smaller storage media within and outside the computer are assisting the programming revolution. Programmable

ROM, being able to add a variety of chips, boards, bubbles, and cards at will, make virtually any software task manageable. Keep in mind, though, that whatever is produced must be clearly understood by the user. Programs can only be as effective as those who must use them. Write clear, debug, install, document, and teach. You are, after all, a facilitator . . . one who understands how a piece of hardware, some software, a task, and some data can be successfully manipulated by people to solve problems. It is always as simple as that! Good luck.